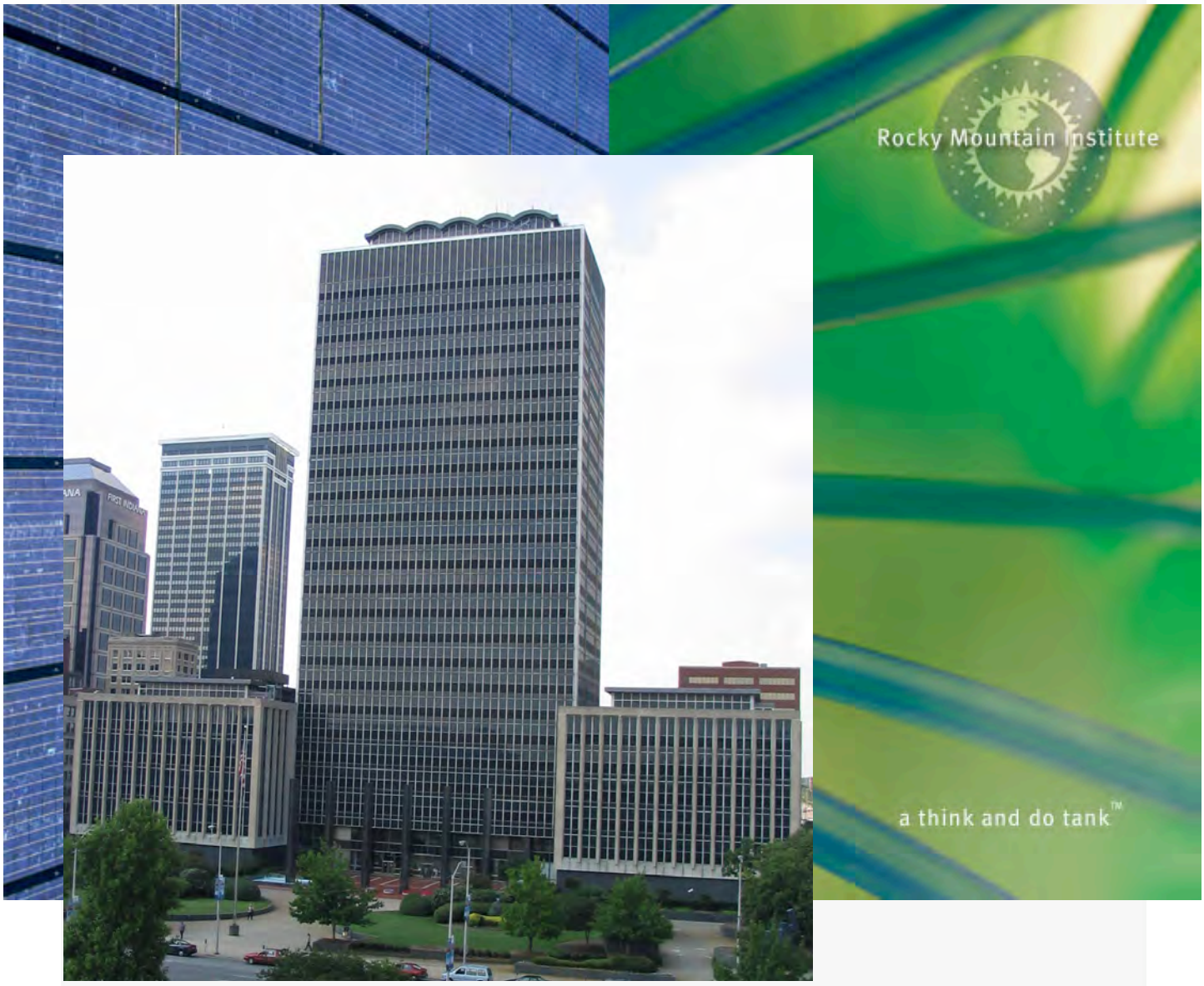
Opportunities & Innovation
Indianapolis City County Building



A Report for the
Indianapolis Office of Sustainability
June 2009

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Executive Summary

This report documents the outcomes of an Opportunity and Innovation Workshop held by the City of Indianapolis Office of Sustainability in conjunction with Rocky Mountain Institute® (RMI) on June 9-10th of 2009. The intent of the workshop was to analyze the potential retrofit of the Indianapolis City-County Building (CCB), including clarification of an overarching goal. More than thirty regional professionals with a variety of expertise attended the workshop. In addition to documenting the outcomes of the workshop, this report includes recommendations for next steps and priorities.

The building was constructed in 1962, an era when energy was perceived as abundant and glazing technology was in its infancy. Despite that, the Indianapolis/Marion County Building Authority has operated the building as efficiently as possible - reducing energy use to 80% of the national average for a building of this age and size. This remains, however, 63% higher than the average energy use of a LEED certified office building.

The following table shows the current status of energy and water use intensity, potential reduction identified during the workshop, and annual cost savings if those reductions are realized. This report outlines recommendations and strategies for achieving these reductions.

UTILITY	CURRENT USE	ANNUAL COST	REDUCTION POTENTIAL	POTENTIAL ANNUAL SAVINGS
Electricity	94,030 BTU/SF	$1,109,505	-40%	$443,802
Steam	19,389 BTU/SF	$217,600	-100%**	$217,600
Water	19.48 Gal/SF	$57,050	-30%	$17,115
				$678,517.00

Table 1. Current Energy and Water Use Intensity w/ Estimates of Potential Annual Savings

**While elimination of steam may be possible, a further cost-benefit analysis is required to determine optimal level of steam reduction.

With this level of potential annual savings, a building retrofit budget can be established based on the desired payback period. Many municipalities and universities allow 10-15 year payback periods, with some reaching for 20 years. This long-term approach for public buildings is critical to the success of the project, and can allow for a total project budget of $6.7M-$13.5M, plus federal and state funding for municipal energy efficiency projects and future capital funding already slated for mechanical system upgrades.

Many potential strategies can contribute to these savings, and the workshop group identified some during a brainstorming exercise called the Dashboard. A compilation of the three breakout groups' dashboards can be found in the appendix of this report for consideration during Master Planning. The possibilities are comprehensive and largely realistic.

In order to map a path to the most impactful retrofit work, the participants of the workshop identified priorities for implementation as outlined on the following page.

Short Term Priorities:

(Low cost, Fast implementation - Now)

- Establish Building/Occupant Baselines:
  - Energy
  - Water
  - Lighting Density
  - Waste Streams
  - Transportation / Commuting
  - Occupant Comfort / Engagement
  - Absenteeism / Productivity / Allergy/Asthma Incidence
- Implement Green Cleaning Policy
  - Cleaning Supplies
  - Bathroom Supplies
  - Cleaning Equipment
- Begin Outreach / Information Program
  - Establish occupant email distribution list
  - Create monthly "Greening" newsletter
  - Post this report online
- Obtain funding for a Comprehensive CCB Master Plan
  - Core Team coordinates effort, provides existing capital planning info
  - Explore ESCO Options vs. Independent Contractors
  - Engage qualified architect, space planner, engineers, energy/sustainability consultant, estimator, and request proposal for Master Plan design with and without an ESCO

Mid Term Priorities:

(Higher cost, Begin long-term implementation)

- Implement Building Energy Retrofit with or without ESCO
- Create Long Term Comprehensive Master Plan
  - Mechanical Systems
  - Lighting
  - Plumbing
  - Energy & Water Conservation
  - Waste Management Areas/Policies
  - Renovation Policies
  - Space Planning / Phased Improvements
  - Transportation / Commuting
- Develop / Nurture Partnerships
  - Downtown Building Owners
  - Corporate Entities
  - Universities
  - Utilities
  - Developers
- Conduct LEED-EB O&M / Energy Star Analysis
- Obtain contracting mechanism for Building Energy Retrofit / Upgrades.
  - Self-funded
  - Bond
  - ESCO
  - Other

Long Term Priorities:

(Capital costs, Long-term implementation)

- Adopt Master Plan as Policy
- Certify under LEED and/or Energy Star
  - Follow Up / Commission Systems / Compare Utility Data
  - Track "After" data for occupant baselines

Introduction

On June 9-10, 2009 the Indianapolis Office of Sustainability brought together more than 30 regional professionals for an Opportunity and Innovation Workshop led by Rocky Mountain Institute® to analyze the potential retrofit of the Indianapolis City-County Building. In the fashion of Greening of the White House[1], an intensive working session ensued that resulted in goals, strategies, and clear next steps. Early on in the workshop it was established that the goal for the retrofit was not simply to renovate the building to become more resource efficient or to manage a certain amount of stormwater. Although these are valuable goals in and of themselves, there emerged an overarching goal of the retrofit: to make Indianapolis a national forerunner in sustainability.

Report Back session following Break Out during the 2-day RMI workshop.

In order to produce robust energy and resource efficiency, a good business case, and ultimately the goal of the participants, it is vital to use a whole systems design process. In whole systems design, decisions are based on a variety of factors ranging from benefits (*e.g.*, energy reduction, cost reduction, LEED points, aesthetics, comfort), to upstream and downstream impacts on other building systems and infrastructure (*e.g.*, more efficient server equipment reduce need for chiller capacity), to the degree to which certain measures achieve overall project goals.

This report provides the framework for developing and implementing a CCB Comprehensive Master Plan for a whole systems design process. In addition to describing the various work groups required to produce this plan, the report also denotes which aspects can be funded immediately, which can be implemented with existing funds, and which elements will require capital funding. A Core team will be primarily responsible for coordinating and implementing the CCB Master Plan. The Core team includes: Kären Haley and Allyson Pumphrey; Ron Reinking (Facility operation); and support staff.

[1] Read about the Greening of the Whitehouse project of 1993 in the white paper found at www.rmi.org.

With regard to green buildings, a city government can put its city on a path of sustainability in three major ways:

- **Regulate or incentivize** green building through codes and/or incentives.
- **Directly increase** the number of green buildings in a city by renovating the ones it owns and occupies. The impact of this strategy is of course limited to the number of public buildings in the city.
- **Raise awareness** of the benefits of green building. In many communities the public sector has constructed the first local green building, providing tenants and developers their first close-up exposure to green buildings.

Clearly, a combination of all three is needed to achieve big impact.

The participants recognized the third strategy as being the major opportunity in the CCB retrofit. They were convinced of the potential impact of a green building everyone can access, which would be the first green public building in Indianapolis. They also believed that demonstrating a good business case with a local green building such as the CCB sends a powerful message and demonstrates fiscal responsibility within the local government. Their strategy is in line with that of the Greening of the White House. In former President Bill Clinton's *Earth Day Address* of 1993, he stated his intention "to make the White House a model for other federal agencies, for state and local governments, for business, and for families in their homes." It is also similar to that of the owner of the recently designed-for-retrofit Empire State Building (ESB), Tony Malkin, who stated:

> *"The goal with ESB has been to define intelligent choices which will either save money, spend the same money more efficiently, or spend additional sums for which there is reasonable payback through savings. Addressing these investments correctly will create a competitive advantage for ownership through lower costs and better work environment for tenants. Succeeding in these efforts will make a replicable model for others to follow."*

Workshop Insights

The following items detail the major outcomes of the charrette and RMI's recommendations for approaching the CCB retrofit project.

Vision for the Indianapolis City-County Building

The building will be a flagship to demonstrate the business case and personnel benefits of a green building retrofit, thereby catalyzing building retrofits around the city to help make Indianapolis one of the most sustainable cities in the nation.

Objectives in addition to creating this vision:

- Prove the business case for resource efficiency
- Be fiscally and environmentally accountable to taxpayers
- The CCB becomes a source of pride
- Occupants are empowered to help make the building and operations radically resource efficient

Implementation Strategy

RMI recommends that the City, in conjunction with facility operation administrators, implement the following tasks with available funds in the fourth quarter of 2009. Potential further funding is addressed in the Major Opportunities section of this report.

The Core Team will be primarily responsible for coordinating and implementing the CCB Master Plan. The Core team includes:

The Indianapolis Office of Sustainability: Kären Haley and Allyson Pumphrey
Building Authority: Ron Reinking and key Facility Operations Staff
Key Personnel from Office of Finance and Management

Representatives from the Indianapolis/Marion County Building Authority discuss building features with workshop participants during the comprehensive workshop.

1. ESTABLISH WORK GROUPS TO CREATE A CCB MASTER PLAN
Responsibility: Core Team
Intent: Commit to greening the CCB and understand the steps involved in this process.
Deliverable: A document to identify integrated work groups on 1) Energy, Water, & Transportation; 2) Indoor Air Quality, Recycling, & Occupant Satisfaction; 3) Financing; 4) Outreach; and 5) LEED EB O&M / Energy Star. For each work group, the staff and financial resources allocated should be specified.
Description: A CCB Master Plan was identified during the workshop as key to the success of this project. RMI recommends that different work groups create the master plan over the next several months. Some groups will end before others. For instance, the Energy, Water, & Transportation work group will need five to seven months to complete, while Indoor Air Quality, Recycling, & Occupant Satisfaction could take only a few weeks or less. As indicated in Table 2, these work groups should be funded as soon as possible. Key elements, outcomes, and estimated timelines for these work groups are provided in Sustainability Work groups.

2. CREATE COMPREHENSIVE CCB MASTER PLAN
Responsibility: Core Team
Intent: Create long-term, phased plan for the CCB to include energy retrofit and associated opportunity for resource efficiencies and space allocation.
Deliverable: A living document that is update-able by members of work groups. Specifies status of implementation for each aspect of plan.
Description: This would be the central document that identifies goals, work plans, available funding, and implementation status. The work groups identified above would contribute to the Master Plan.

Investment Opportunity: Cost Range Estimates of Mid Term Implementation

Comprehensive Long-Term CCB Master Plan	Low	High
Energy, Water, & Transportation	$150,000	250,000
Investment Grade Audit (IGA)	$400,000	$560,000
Open Office Space Pilot Planning	80,000	150,000
Financing Study	$10,000	$15,000
LEED / Energy Star Analysis	$5,000	$15,000
Totals	$645,000.00	$990,000.00

* Note that if the City were to sign a project development agreement (PDA) with an energy service company (ESCO) toward considering an energy service performance contract (ESPC), the cost of the IGA would essentially be rolled into the ESPC, if signed. In effect, the IGA cost would be shifted to implementation.

Table 2. Estimates of initial cost of required mid-term measures, including what should be funded immediately. Sources and assumptions can be found in the Appendix.

3. EARLY IMPLEMENTATION OF MASTER PLAN
Responsibility: Core Team
Intent: Leverage available funds to maximize visibility and overall success of project.
Deliverable: A phased timeline to denote what aspects of the Master Plan shall be implemented before all categories of the master plan are completed.
Description: This task was created to account for the fact that the Energy, Water, & Transportation work group cannot be completed until months after the other work groups have contributed their portion to the CCB Master Plan and that more immediate implementation of these portions would positively contribute to the momentum, visibility, and overall success of the project.

- Financing
- Outreach
- Air Quality, Recycling, & Occupant Behavior
- LEED EB O&M / Energy Star Analysis
- Green Cleaning

Major Barriers

The identification of barriers to achieving a vision typically calls out opportunities for success. The workshop participants identified the following major barriers. The work groups should address these while developing the CCB Master Plan. More than one work group can and should address the same barrier.

Financing is to be determined

The CCB retrofit presents the city-county with the opportunity to save money over an extended amount of time, in addition to meeting the overall goal of broader impact in Indianapolis. Like any investment, this requires an upfront cost to develop and implement the CCB Master Plan. The exact source of funding for this project is yet to be determined.

Lack of continuity

The implementation of the CCB Master Plan may span across two or more city administrations. When administrations transfer, existing projects and plans are oftentimes derailed.

City and County departments are siloed

Like most large organizations, there exist sub-groups in the city-county administration that are oftentimes unaware of what the other is doing. It is possible for one group to create an agenda that conflicts with the agenda of another.

Building must remain occupied

It is far easier and usually least expensive when a building can be empty for a major retrofit. In the case of the CCB, it is not possible to relocate all the occupants. The retrofit will need to occur with minimal occupant distraction.

Major Opportunities

Workshop participants identified the following major opportunities after discussing the barriers above. Note that not all barriers are addressed by the opportunities listed in this section and will need to be addressed by the work groups.

Several types of financing are available

Workshop participants proposed several financing opportunities. While no single source could likely fund the entire project, a combination of opportunities would provide a significant source of funding. They include:

Contracts

- Energy Services Performance Contract
  - Contracted with an Energy Services Company
- Bonds
- Sale/Leaseback
  - Buyer purchases building, city leases building back over a certain amount of time. Ironclad provision that buyer must sell back.
  - If a private entity can benefit from more incentives or grants, then this option may be more cost-effective than a standard loan. Energy efficiency incentives and historic preservation tax credits could figure significantly into this equation.

Grants and incentives

- Foundation and non-profit sources
- American Recovery and Reinvestment Act (ARRA)
- Indiana Office of Energy Development
  - Alternative Power and Energy Program
  - Feasibility Study program
  - Competitive funding
- Guaranteed Energy Savings Program

Partnerships and programs

- Sponsorship programs (e.g., sponsor a green cleaning workshop, buy a brick, etc.)
- Loyalty programs (e.g., sustainable purchasing plan)
- Partnership with University
  - Unpaid (or low cost) student internships

Whole-systems, life cycle cost analysis

There is a major opportunity for the Core Team and members of the design team to demonstrate the best approach to assessing the cost and benefits of the project alternatives – whole-systems life cycle cost analysis. The traditional approach is to assess one measure (e.g., renovating the chiller or installing high performance windows) at a time. This is typically done by estimating the resource savings and cost of a single measure. Some measures are shown to be more cost-effective (i.e., cost per amount of resource savings) than others. As the low hanging fruit is used up, only the more "expensive" measures are left. As indicated in Figure 1 below, eventually a cost-effectiveness limit is reached.

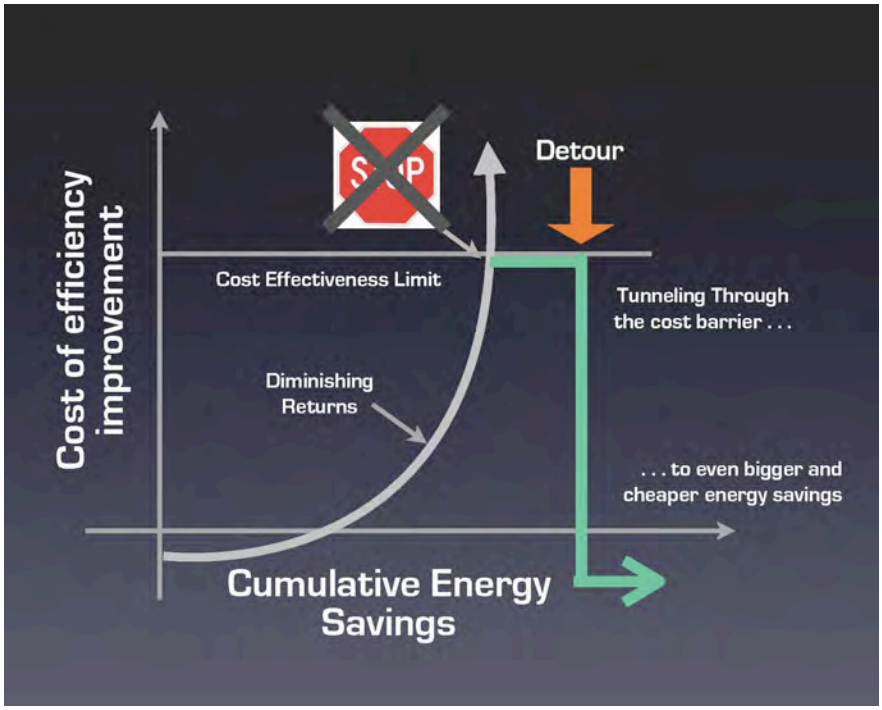

Figure 1. Whole-systems life cycle approach to cost and benefit analysis.

The major problem with this approach is that the interconnections between measures are not accounted for.[2] For instance, installing high performance windows and other energy-efficient equipment will reduce peak power demand, even so much that a chiller due for renovation is no longer needed in the building. The resultant savings can help pay for the added cost of the windows and other energy-efficient equipment, which can then also contribute to a more productive workplace with lower personnel costs, as also illustrated in Figure 1. These exponential benefits are lost if we are too focused on individual measures.

As an alternative, RMI recommends the CCB team assesses measures not one-by-one, but in bundles to better consider the interdependency of certain measures. The resource savings and net present value (i.e., life cycle cost) of each bundle of measures should be estimated. The team should also consider other value of the bundles, such as increased office productivity and how well the bundle would support the vision of the CCB project. RMI has provided an "Integrated Design Process Checklist" in the Appendix to aid the team in this process, in order to optimize capital and operational cost savings and achieve the overarching vision for the CCB as a "flagship" building.

Outreach to provide momentum for "Greening of the City-County Building"

It is important to get the entire city of Indianapolis excited about this project as well as the occupants. For this reason, RMI recommends an entire work group for outreach and

[2] For more on this concept, see Chapter 6 "Tunneling through the cost barrier" of *Natural Capitalism* (1999) or http://www.natcap.org/.

education. Specific opportunities in this regard are presented in the Sustainability Work Group section of this report, Outreach subsection.

Integrate with clean-tech transportation infrastructure

An RMI-led program, *Project Get Ready*, has partnered with the Indiana Energy Systems Network, created by Governor Daniels, which has assembled a world-class team to commence a demonstration program that will accelerate the market introduction and penetration of advanced electric drive vehicles (AEDVs) and related technologies in the Indianapolis area.[3] RMI recommends that the Energy, Water, & Transportation work group explore opportunities with Indiana Energy Systems Network to demonstrate these technologies at the CCB. In addition, this work group should explore other creative ways to encourage alternative transportation for commuting occupants and visitors.

[3] As described here: http://projectgetready.com/city/partner-city/indianapolis-region

Workshop Results

A major portion of the workshop was spent brainstorming specific goals and strategies for the CCB retrofit via a "dashboard" matrix. The results from sessions on different categories are highlighted below. The compiled dashboards can be viewed in the appendix of this report.

Breakout group dashboard under development

The dashboards reveal there are clearly immediate measures that can begin to create energy savings with little cost to the City, such as outreach and education on the greening of the CCB, to start an occupant awareness campaign, and implementing a comprehensive recycling / green purchasing policy. Occupant behavior was identified as a key component of CCB energy savings efforts.

The most urgent, impactful solutions discussed during the breakout sessions were: a) Create long-term comprehensive master plan for the building addressing energy and resource conservation. b) Establish baselines (*e.g.*, occupant satisfaction and comfort, GHG emissions, energy and water, waste, recycling, etc.). c) Create a "model" open office and restroom to demonstrate good daylighting, layout, energy and water efficiency in a desirable workspace.

Discussions on water centered not on how to decrease use, but rather what to do with the 225GPM that is pumped from the lowest level of the parking garage 24/7. This is an enormous quantity of water to simply send into the storm sewer without using it for something. As shown in the water dashboard summary, there are a number of opportunities for reducing potable and well water use and replacing it with pumped water.

The following are highlights of the results of our brainstorming sessions with the three breakout groups at the workshop:

(Disclaimer: Ideas/Visions featured in this section are from workshop participants. They are tools for encouraging workshop participants to think long term and out of the box. RMI recommendations are provided in "Recommended Priorities" for each focus area and in The Work Group section.)

Energy

Comparison

A helpful way to approach the issue of setting goals with regard to energy is by referring to the DOE's Commercial Building Energy Consumption Surveys (CBECS), which provide "average" building energy characteristics. According to Target Finder, a tool provided by the DOE, a building of similar size, type, climate, and occupancy rate to the CCB has an energy use intensity of 125 thousand Btu (kBtu) per sq. ft. The CCB currently uses 5% less energy than this "average" building[4]. This is because of the fairly energy efficient, albeit closely monitored, operation of its dual duct HVAC system - notoriously energy intensive and has since become a rare design. For a more specific comparison, the CCB uses 20% less energy than buildings of this size and era.

Despite the CCB already being energy efficient relative to other buildings of that era, there remains a lot of opportunity to increase efficiency. For example, the Empire State Building, which operates in the top 30% of buildings its size and type, was able to be retrofitted to save 38% energy, sending it into the top 10% of buildings (an Energy Star Rating of 90). For the CCB to reach the top 5% (an Energy Star Rating of at least 95), its energy use would need to decrease by 50%, or roughly 57 kBtu per sq. ft.[5] If the CCB is to become a flagship green building, an aggressive goal such as this is almost required.

Vision

- Reduce energy use >40% + additional on-site renewable energy (e.g., photovoltaics) for total 60-80% energy reduction
- Save $700k - $950k annual energy cost for this building
- Can the building generate more energy than it consumes?
- Utilize nearby bio-based methane energy source - landfill
- Generate 15% on-site renewable energy
    - Establish electric vehicle plug-in demonstration on site

Potential Strategies

- Perform ongoing retro-commissioning
- Install occupancy sensors for lighting on private offices, meeting rooms, and other smaller spaces
- Install LED / bioluminescent exterior lighting
- Seal ductwork
- Reconfigure HVAC for core waste heat recovery – reduce steam
- Decentralize lighting controls – allow occupant control

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[4] In fact, according to facility operators, the CCB uses 65-70% less steam than it did as originally designed to operate.

[5] The decrease in energy consumption is based on "source" rather than "site" energy, which explains why the target energy use intensity is 57 kBtu per sq. ft. and not 50% of 125. For definitions of source and site energy, please visit the DOE's Energy Star website.

- Remove exterior window blinds, install spectrally-selective film instead = improved views, increased daylighting, decrease light fixture count
- Conduct lighting density analysis, followed by lighting adjustments
- Place green/vegetated screen shading devices on lower south façade, east/west wings
- Construct second skin exterior walls
- Install task/desk lighting at workstations and/or motion sensors
- Create open office plans – improve daylighting, space allocation, indoor air quality
- Bring daylight to garage via shafts = Improved natural ventilation, less mechanical ventilation

Barriers

- Lack of long term Master Plan *What's coming down the pike? What's the big picture?*
- Cost and efficiency of renewable energy
- Need metering at each floor/dept—if we can't measure it, we cannot manage it.
- Lack of departmental accountability for energy consumption
- Potential open plan acoustical concerns
- Exterior window shades inhibit effective daylighting/views, require more lighting
- Central lighting controls are very inefficient
- Inertia—resistance to change
- Funding for large-scale undertakings—what is an acceptable payback period
- Changes in administration

Panel of lighting control switches shows existing zone approach to lighting

Potential Solutions to Barriers

- Energy Savings Performance Contract
- Start with conservation / human behavior… then projects
- Establish baselines
- Display real-time building data in the lobby, create newsletter
- "Brand" the greening of the CCB – PR
- Model waste heat recovery concept

- Partner with DOE / Unions for renewable energy installation
- Create a "model open office space" with daylighting, conference rooms, privacy rooms, etc
- PR/Outreach to occupants and taxpayers

Recommended Priorities

- Energy audit
- Recommission the building
- Make adaptive comfort adjustments – cool in winter, warm in summer
- Create a long-term strategy for space planning
- Sub-meter each floor at trunk lines – remote
- Performance surveys
- Create Master Energy and Resource Plan for the CCB
- "Lights Off" campaign
- Calculate GHG footprint
- Green leases for departmental tenants

Water

Comparison

The CCB uses 19.5 gal/sq. ft./yr, and the target range for an office building falls between 9 and 15 gal/sq. ft./yr. This puts the CCB at approximately 30% over the mid range for water consumption in an office building, excluding chiller water. With no significant water fixture upgrades since construction, this building is due for fixture replacement. While both chiller and irrigation currently run off well water, that is potentially potable and subject to conservation measures due to the loss of aquifer resources.

Vision

- 30% Reduction in potable water use
- Zero stormwater discharge
- Potable water gets used twice before leaving bldg
- Eliminate well water use

Potential Strategies

- Waterless urinals
- Low-flow / dual flush toilets
- Low-flow faucets – hydropower automatics
- Use ground water for heat recovery and flushing toilets
- Re-use dewatering (sump) water
- 225 GPM ground water sump pump to chiller / toilets / irrigation / fountain
- Bioswales – natural stormwater management as landscape feature
- Groundwater solutions meeting with adjacent building owners

Barriers

- Longer payback for water efficiency
- Bad impressions of waterless urinals due to lack of maintenance training
- State codes that prohibit use of greywater in toilets
- Greywater to toilets hard to retrofit
- Sizing/designing bioswale for cumulative water in urban setting

Potential Solutions to Barriers

- Green roof as a plaza (parking underneath)
- Low-flow urinals / toilets
- Replace faucets
- Install rain sensors on the irrigation system
- Convene a downtown building-owners meeting to address urban scale water table pumping uses.

Recommended Priorities

- Create a Master Plan
- Install cost effective water conserving plumbing fixtures such as low flow toilets, motion-sensor sinks, etc.

Materials

Comparison

There is currently no municipal policy for sustainable construction practices during remodeling projects within the CCB or for green purchasing or green cleaning. Many cities participating in the Mayors Climate Protection Agreement have adopted green purchasing policies and are requiring LEED certification for all new buildings and major renovations, introducing sustainable construction methods by doing so.

Vision

- All City remodels meet LEED Gold min
- Create native landscape plaza
- Purchase 95% sustainable construction material
- Limit/Eliminate use of Volatile Organic Compounds (VOCs)
- Conspicuously separate dumpsters for ongoing renovation waste
- Establish green cleaning practices in next contract round
- Purchase 95% sustainable office supply purchasing
- Educate, educate, educate
- Centralize purchases or qualified vendor list / purchasing consortium
- Drastically reduce paper consumption (work with IT for digital filing, duplex printing)

Potential Strategies

- Establish LEED certification mandate for new and existing city buildings
- Encourage local / regional materials use
- Retrofit /reuse panels+doors
- Create model urban garden
- Purchase refurbished office systems for open office model
- Establish partnerships - create a critical mass
- Purchase w Life Cycle Analysis (LCA) as factor - durability
- Establish vendor prequalification
- Use the 'service model' for furniture/carpet/electronics
- Share resources (copiers/printers)
- Establish building management purchasing policy
- Utilize interns for research
- Purchase only 30% recycled content paper – an easy accomplishment
- Set printers/copiers to duplex as a default
- Be conscious of chemical impacts: air quality

Barriers

- Possible "historic" designation (also funding opportunity, however)
- Contractor perception of LEED construction effort
- Verification
- Quality control if not using LEED
- Where do we put construction waste recycling dumpsters
- How do we change behavior
- Departments are siloed – no means of regular communication/ coordination
- Cost perception
- Availability of eco-friendly office supplies
- Processing/manufacturing/disposal of supplies needs to be considered
- Paper requirements for courts is absurd and ingrained

Potential Solutions to Barriers

- Public solutions/wins – small business opportunities
- Create working business model with paybacks
- Educate Building Authority staff and building occupants
- Outreach to departments and other municipalities
- Central purchasing incentives / purchasing consortium
- Sustainable office supply catalogs
- Address cost perception: 5% higher cost but 20% reduction in quantity used

Recommended Priorities

- Study of "open" office panels → reuse/reconfigure existing
- Create permanent building recycling program with Champion
- Green catering for city events- require this and build local capacity
- Distribute local recycle bins with all regular trash locations within building
- Green Procurement Policy
- Run a baseline Indoor Air Quality test

Waste

Comparison

The CCB does provide basic recycling services for paper, cardboard, bottles, and cans, with central locations for the bins. In comparison, many offices and public buildings have recycling bins at every desk and in all public waste receptacle locations. The rule of thumb is to locate both recycling and landfill at every waste location, with a trend toward larger recycling containers than landfill.

Vision

- Profit from paper recycle stream
- Find a new home for panels → another location / retrofit-alter
- Reduce operating waste to >75% diversion
- Educate, educate, educate
- Partner with schools - turn waste into art / education
- Establish green cleaning policies
- Enforce maintenance guidelines

Potential Strategies

- Place recycling at each desk
- Make recycling visible in public areas
- Label regular trash as "Landfill" to make the destination real
- Sort materials / mixed recycling
- Limit paper waste – involve IT
- Accelerate existing initiative in data center
- Provide green cleaning supplies on each floor for individual staff access

Barriers

- Space allocation
- How do we convey importance to taxpayers
- Tendency to consider only initial cost and not payback

Potential Solutions to Barriers

- Conduct waste stream audit
- Create waste management plan
- Re-allocate space for recycling
- Create a case study for other municipal buildings to follow

Recommended Priorities

- Waste stream audit
- Set baseline
- Create recycling / waste policy

Occupant / Visitor Behavior

Comparison

Regional attitudes toward environment, energy efficiency, and conservation vary greatly throughout the country. *Indiana Business Journal*, working with Walker Information Inc., an Indianapolis firm specializing in surveying employee sentiment, conducted a poll this year to determine reader attitudes about environmental issues.[6] Many readers said they're also recycling more, cutting their use of electricity, bicycling to work, driving hybrid cars, drinking from refillable water bottles rather than throwaway plastic, planting their own gardens, or doing something else to lessen their carbon footprint. The survey shows that many IBJ readers say they've made changes to their lives to be "greener":

- 77 % said they now pay bills online rather than through the mail.
- 74 % have switched to fluorescent light bulbs and 60 % to reusable shopping bags.
- 41 % strongly agreed that the city should pursue a mass transit system of bus, light rail, and other options on a broad scale. Of these respondents, 36 % supported paying more in gas taxes to fund the program.
- Approximately 33% agree recycling should be mandatory, though not as many are willing to pay extra.

The survey findings seem to confirm what the city is working towards.

Vision

- Eliminate bottled water use / sales
- Offer regional (and/or organic) food in convenience store in lobby
- Conduct an occupant survey/ engage employees (coffee breaks)
- Seek 100% participation in programs
- Make the CCB a city wide example of a "Green Workplace"
- Brand it! Reusable coffee mugs with greening logo
- Find the champions and celebrate them, then make more green champions
- Understand impact and act/advocate
- Address not just users - but visitors and *online* visitors
- Create passionate and accountable people
- Generate high demand for vehicle plug-in stations
- Create room level power controls
- Reduce commuter emissions – bike, walk, bus, carpool, telecommute
- Achieve 30% better space utilization – be smarter about departmental layouts to avoid unnecessary expansion.

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[6] Survey conducted with IBJ working with Walker Information Inc. in July 2009. Results available at: <http://www.ibj.com/ibj-daily-reader-green-poll-results/PARAMS/article/6997>

Potential Strategies

- Include the tenants in implementation plans
- Tenant standards/incentives
- Centralized break rooms
- Better amenities in plaza – useful space
- Peer education/pressure
- Recycler of the month
- Make it convenient
- Track printing by department / employee
- Communicate! Utilize mail distribution list.
- Create awareness and accountability at individual level
- Incentivize bicycling, mass transit, telecommuting
- Provide Eco-passes for bus
- Create optimal work environments – daylight, air quality, social contact
- Educate users
- Seek personal/departmental commitment
- Incentivize lower energy use (Competition/ Party/ Rebates)
- Provide feedback and two way communications
- Assign high/Low elevators = energy savings
- Seek Energy Star rating
- Establish power down policies

Barriers

- Difficult to inspire occupants
- Difficult to change occupant habits
- Infrastructure cost
- Need to expand users' environmental knowledge
- Takes time required to set up programs
- Printing mayor's name on city documents – limited life
- Lack of enforcement for new policies
- Administration changes
- Need to quantify the benefits of increased productivity and lower absenteeism

Potential Solutions to Barriers

- Provide bike racks/showers/lockers
- Office of Sustainability utilize email distribution list for building occupants
- Make time to do this
- Delegate some work to person in each department
- Institute training from HR/sustainability office
- Educate → tell the full story
- Anticipate challenges & communicate them, honesty when things don't work out
- Be the Sustainability Lab for Indianapolis
- Create a Pilot project on one floor as demonstration
- Provide real time feedback
- Use green leases
- Implement energy policies /purchasing

- Educate/newsletter/video
- Hold an occupant workshop to get ideas
- Increase occupant Awareness
- Conduct occupant surveys
- Install vehicle plug-in stations
- Establish community based social awareness – celebration
- Make the Indianapolis Cultural Trail connection

Recommended Priorities

- Educate
- Utilize building email list
- Measure & Communicate
- Conduct occupant surveys
- Promote bicycle enthusiasm with bike racks and lockers
- Conduct a space utilization analysis – what percentage is wasted space
- Host energy fairs for staff and public to learn about cost/energy savings

Sustainability Work Groups

As specified in Workshop Outcomes, several work groups should occur simultaneously in order to develop the CCB Master Plan. This section of the report will specify the estimated time and other key elements of these work groups.

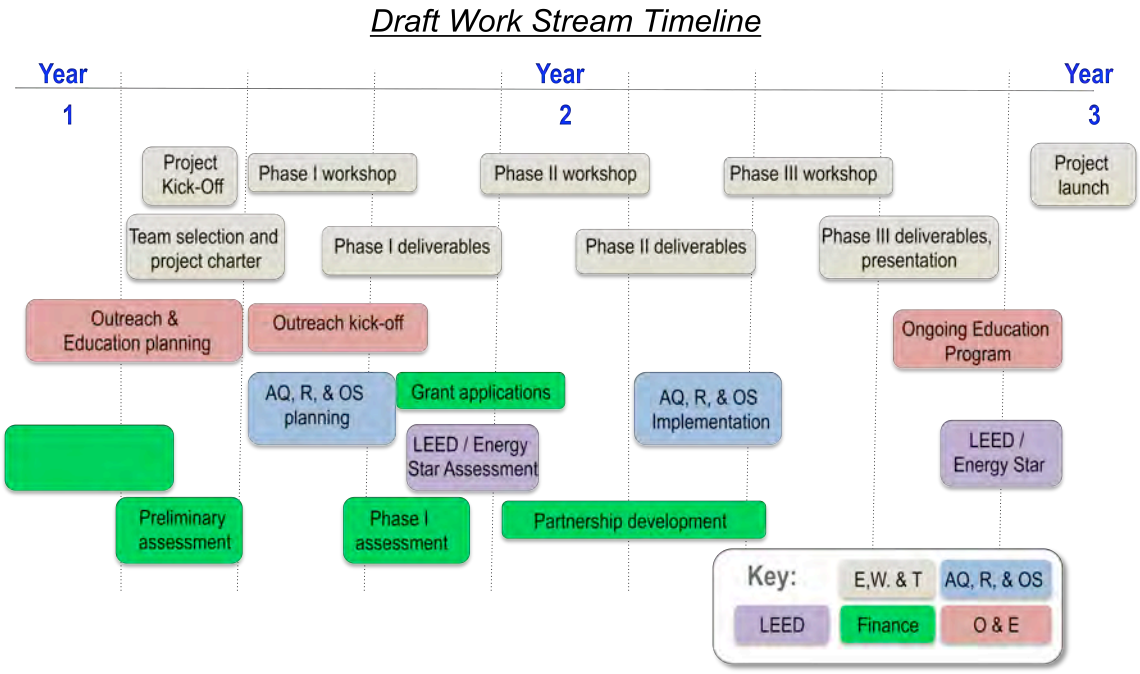


Figure 1. Estimated work group timeline. This represent RMI's best estimates based on experience with similar projects. This timeline should be reviewed by the Core team and modified as it sees fit.

Finance

Suggested work group members: Core team, finance consultant

Perhaps the most critical work stream is the one to assess and obtain financing for proposed projects and programs. As listed in the Major Opportunities section, the core team can explore a variety of alternative financing options. It is important to realize that there will likely be more than one solution, and a combination of grants and other funding opportunities (such as partnership with the local university for intern positions) could offset a portion of the total capital cost of the project.

The Finance work stream should create a work plan that includes a list of all possible contacts and possibilities. As the plan is implemented, this list may grow as new possibilities are uncovered. The core team should reach out to finance experts (for-profit or pro bono consulting) for help with this work. The preliminary assessment should happen immediately, while the Phase I assessment should be informed by the results of that phase of the Energy, Water, & Transportation work stream to provide a better sense for the capital cost of the project.

Outreach and Education (O&E)

Suggested work group members: Core team, Marketing consultant

The Outreach work group should create a plan to engage taxpayers and city-county administration, explain the retrofit project, and create public enthusiasm. This plan should include close interaction with the other work groups in order to maximize the impact of their efforts in the greater Indianapolis community. For instance, if the Green Cleaning or Air Quality, Recycling, & Occupant Satisfaction work group plans to conduct a workshop, the Outreach work group should plan a way to do it in conjunction with the local chapters of the United States Green Building Council, International Facility Management Association and others.[7] This would generate additional publicity and goodwill for the project.

After implementation of the retrofit, the verified results (produced by the other work groups) should be turned into a case study for local businesses and others.

Communication

Communicating the anticipated and measured benefits of the retrofit will influence the ability of the project to get financed and the extent of the project's impact in Indianapolis and the greater region. In addition, an objective of the charrette participants was to make the retrofit process accountable to taxpayers. Accordingly, this work group should be responsible for communicating the efforts of the other work groups to the public and contracting with a marketing consultant to develop a brand for the retrofit project.

Outreach

After resource savings, economic benefit, and other attributes of the project have been determined by the other work groups, the Outreach and Education work group can begin their efforts. Activities could include:

- Form a "speakers bureau" consisting of workshop participants who present on the retrofit project at town hall meetings and other events in Indiana;
- Develop a slideshow presentation for the speakers bureau;
- Write a newsletter to keep public updated on implementation progress; and
- Create a brochure that can be distributed within the CCB and other venues.

Air Quality, Recycling, & Occupant Comfort (AQ, R, & OS)

Suggested work group members: Core team, Air Quality consultant, Recycling consultant

The Air Quality, Recycling, & Occupant Satisfaction work group will produce a plan to establish the baseline (e.g., via air testing, a waste audit and occupant surveys), decide on goals, improve processes, and quantify the level of improvement. Elements of this work group can be divided as follows.

[7] As suggested by Stephen Ashkin, Ashkin Group, LLC. (personal communication)

Air Quality
RMI recommends an air quality assessment be conducted to measure various types of particulates and CO2 in separate areas of the building. This should be used both as a baseline and as a catalyst for immediate measures if necessary. Efforts to improve air quality should begin with immediate Green Cleaning implementation and continue throughout the course of the entire project.

Recycling
The Indiana Recycling Coalition should be a key partner for the work group.[8] The element has two main parts. The first part regards the diversion of construction waste. The second is on the management of solid waste generated during the operation of the facility. An excellent resource for conducting a waste audit and solid waste management is the LEED EB O&M (Existing Buildings Operations & Maintenance) Reference Guide, available through the USGBC.

Occupant Comfort
As part of presenting the results of the retrofit in terms of financial and resource efficiency benefit, it would be compelling to tell a story of improvement in occupant satisfaction. This element should include immediate occupant surveys regarding visual and thermal comfort to establish a baseline. Baselines should also be established based on absenteeism and work productivity. After the retrofit has been implemented, the same items should be measured again to see improvement.

Efficiency: Energy, Water, & Transportation (E, W, &T)

Suggested work group members: Core team, various consultants
The E, W, & T work group will ultimately produce a package of measures for the retrofit of the CCB for water and energy efficiency, including not just the building but also the city-county automobile fleet. The package may include anything from utilization of sump pump water to the installation of plug-in stations for electric vehicles that give and draw power from the CCB. RMI recommends package selection based on two main criteria: resource efficiency and life cycle cost.

One member of the Core team needs to champion the cause of a profitable, whole-system, radical efficiency retrofit. This person should monitor the progress of the work group every two weeks. Throughout this process it is vital for building operations staff to provide input as the work group develops recommendations. Monthly milestones should be established. One or more presentations should be given to the public, the mayor, and other notables during the project development process.

The key stages of this work group are Pre-Programming, Inventory & Programming, Schematic Design, and Design Development & Final Recommendations.

[8] Contact workshop participant Carey Hamilton, Executive Director, Indiana Recycling Coalition, Inc. http://www.indianarecycling.org/

Draft Energy, Water, & Transportation Work Stream Timeline

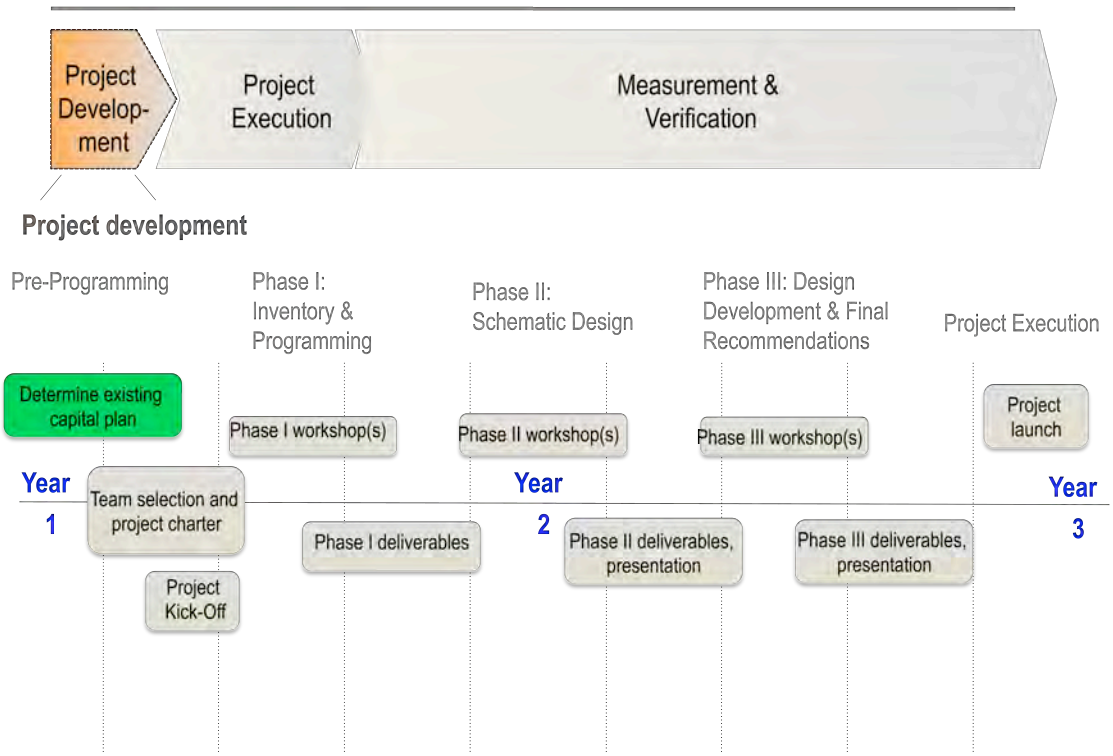


Figure 2. Estimate of E, W, & T Work Group Timeline. This represents RMI's best estimate based on experience with projects of similar type.

Pre-Programming
Key elements of Pre-Programming are described below.

1) Determine existing capital plan. Identify any and all planned facility projects in the CCB. Answer the following questions:

- What type of project?
- When will it be implemented?
- Is it already funded? If so, how?

The intent of this element is to capture the replacement cycle of building systems, reveal other opportunities to coordinate with planned projects, and help establish the comparative baseline. This information is required to optimize a whole systems building retrofit explained in Major Opportunities. The Core team should determine and document the existing capital plan.

2) Team selection and project charter. Includes selection of consulting team members and contracts. This task should also be completed by the Core Team.

- Energy contract could be with an engineering consulting firm or it could be an energy services performance contract (ESPC) with an energy service company (ESCO). The benefit of the former would be that the Core Team keeps its options open with regard to choosing a contractor for implementation. The benefits with

the latter are that a certain amount of energy savings is guaranteed and the cost of the audit and analysis is wrapped into the project implementation.
    - RMI strongly recommends the ESPC ESCO option since the proposed design recommendation has a better chance of implementation and there is a guarantee on the energy cost savings – if the design does not meet the targets, the ESCO writes a check for that difference to the city-county. Extra savings accrue to the city-county.
- ESCO Peer Review consulting team to enhance the ESPC outcomes - members should include project manager, technical consultant and reviewer, envelope and glazing expert, MEP (mechanical, electrical, and plumbing) expert, energy modeler, economic modeler, lighting expert, water and stormwater expert, ecosystem services expert, and transportation (specifically, plug-in hybrid electric vehicles) expert.

3) Project launch. This event marks the official start of the implementation of the decided-upon retrofit design.

Phases I, II, and III
Workshops and deliverables. A team workshop should be held early on to determine goals and work plan. The details regarding other workshops and deliverables are largely dependent upon team selection, the team workshop, and what is learned from the building audit. Items could include an estimate of "theoretical minimum" energy or water use of the building, a baseline building report, and final recommendations. The final recommendations would be included in the CCB Master Plan regarding energy, water, and transportation. This plan would detail design and maintenance (*e.g.*, scheduled commissioning of HVAC equipment) measures.

Project Execution
This stage may include measures that continue for several years or are not implemented for years later (*e.g.*, in order to align with the replacement cycle of existing equipment). As indicated in the timeline above, an engineering contract for ongoing commissioning services should extend until at least 2025.

LEED / Energy Star

Suggested work group members: Core Team, Office of Sustainability, support staff
The workshop participants generally agree that seeking high certification under LEED (Leadership in Energy and Environmental Design) and/or Energy Start would provide motivation and help the project create the desired impact on Indianapolis and the greater region. For an occupied retrofit project, it is appropriate to seek LEED EB O&M (Existing Building Operation & Maintenance) certification and/or Energy Star. This work group is responsible for registering the project with the USGBC (United States Green Building Council). Upon initial review of the checklist during the workshop, participants determined that it would be possible to achieve LEED Platinum with a stronger possibility of LEED Gold. The LEED checklist is provided in the appendix.

The implementation phase of this work group would begin after the project is registered. During implementation, members of the LEED / Energy Star work group are responsible to take over the preliminary LEED EB O&M checklist that was filled out at the workshop (and is located in the Appendix). This work group will need to interact and coordinate routinely with the other work groups to verify that certain credits will be awarded. We strongly recommend that Energy Star Portfolio Manager be utilized for this and all buildings under the management of the Building Authority.

Conclusion

What does it mean for Indianapolis to be a forerunner in sustainability? How will the story take shape? In what way can the retrofit of the CCB catalyze this transformation? These are the questions more than thirty regional professionals addressed at the workshop. It was clear that biggest impact could be created through a combination of strategies, including the requirement of green design practices in each of the city- and county-owned buildings and the establishment of regulations or incentives and guidance for green design in Indianapolis. Workshop participants focused on what was most realistic and within their areas of expertise: to retrofit the CCB and inspire others to do the same in the Indianapolis region. This report documents the major outcomes of this workshop and provides next steps for the Core Team.

The goal of the CCB retrofit is to create broad impact across the Indianapolis region. Participants concluded that demonstrating a good business case and exhibiting the occupant benefits of green design could accomplish this. This report outlined the major work group categories and personnel required to prepare for this approach.

This report provides the framework for a CCB Comprehensive Master Plan and denotes which aspects might be funded immediately, which might be implemented with available funds, and which elements require additional capital funding.

As documented in the Major Results section of this report, there is a clear opportunity to retrofit the CCB for radical resource efficiency and improved occupant comfort. Unlike what is expected by the traditional cost-benefit analyst, as described in Major Opportunities, greater efficiency does not always bring about greater cost. By pursuing aggressive efficiency gains, we can actually reduce capital as well as operating cost of the CCB retrofit, producing an attractive net present value of the investment. However, the opportunity with the CCB retrofit lies well beyond that of the individual building. The success of the CCB retrofit will likely help convince businesses in the Indianapolis region that robust resource efficiency is vital to a successful business model.[9]

[9] There is strong logic that links radical resource efficiency to a competitive advantage for businesses. The traditional worldview (that dates back to the Industrial Revolution) is that services and materials from nature are abundant and cheap, and that labor is the limiting factor to economic growth. We are now beginning to realize that there is an abundance of people, resources are dwindling, and the use of fossil fuels is changing the Earth's climate. Accordingly, the timelier worldview is that labor is abundant and nature presents the limiting factor. The book *Natural Capitalism* presents core principles for businesses to adapt to this contemporary world (a "second industrial revolution") and thereby gain an advantage over competitors. See the Appendix for more information. *Natural Capitalism* is freely available at www.natcap.org.

Appendix 1: Team Members and Workshop Participants

Green City-County Building Development Team Members and Workshop Participants

June 9-10, 2009

Last Name	First Name	Company
Adams	Elaine	Rocky Mountain Institute®
Bendewald	Michael	Rocky Mountain Institute®
Haley	Kären	Office of Sustainability, City of Indianapolis
Pumphrey	Allyson	Office of Sustainability, City of Indianapolis
Reinking	Ron	Indianapolis/Marion County Building Authority
Perkins	Doyle	Indianapolis/Marion County Building Authority
Peterson	Mark	Indianapolis/Marion County Building Authority
Collins	Amber	Marion County Health Department
Sahm	Andy	Shiel Sexton
Brown	Bill	Indiana University
Allen	Brad	Trane
Hamilton	Carey	Indiana Recycling Coalition
Downs	Chris	Johnson Controls
Flandermeyer	Craig	Schmidt Associates
Overbey	Dan	BDMD Architects
Kavulya	Geoffrey	Ratio Architects
Livers	Glenn	IPL
Silcox	Greg	ReThink
Ellis	Jason	Keystone Construction
Kingsbury	Jeff	Greenstreet
Mader	Jeff	Synthesis
Ton	Jeff	Confluence Dynamics LLC
Roberts	Jennifer	Elements Engineering
Mendoza	Jill	IDO
Trovillion	Kristen	IN Office of Energy & Defense
Geisselman	Kurt	Siemens
Leising	Luke	American Structurepoint
Darrall	Mark	A2SO4
Grant	Mark	Ice Miller
Hauser	Mary	Browning Investments
Campbell	Mike	Hilton Garden Inn
Stucky	Natalie	Bose McKinney Evans
Brown	Ryan	Lauth
Miller	Sam	JFNew
Hempstead	Sarah	Energy Solutions
Ashkin	Stephen	The Ashkin Group
Robinson	Steven	URS
Blahnik	Ted	Williams Creek Consulting
Thoman	Tim	Performance Services Inc
Villalta	Alvaro	Durkin and Villalta PE
Roeder	Tom	DesignAire Engineering

Appendix 2: Sources and Assumptions for Cost Analysis

Sources and assumptions for Table 1, Investment opportunity

	Energy, Water, & Transportation	**Air Quality, Recycling, & Occupant Satisfaction**	**Financing**	**Outreach**	**LEED EB O&M**
Create CCB Master Plan	Based on RMI experience	Green cleaning workshop: $3-5k; 0.5 FTE for 3 months.	0.25 FTE for 3 months; for-profit consulting services	0.25 FTE for 3 months	0.25 FTE for 2 months
Implement CCB Master Plan	Based on RMI experience	LEED EB O&M credit 3.1 "Cost of cleaning"	0.25 FTE for 2 months	Outreach: $5k; Website, brochures, etc.: $15-20k; 0.25 FTE for 4 months	0.75 FTE for 3 months; LEED EB O&M project certification fee ($12.5k)

FTE: Full-time equivalent in Core team

Appendix 3: Integrated Design Process Checklist

Integrated Design Process Checklist

The integrated design process allows for the introduction of more variables and "what-if's" than a conventional project development process. Accordingly, design decisions can become very complex.

Decisions are based on a variety of factors ranging from benefits (energy reduction, cost reduction, LEED points, aesthetics, comfort), to upstream and downstream impacts on other building systems and infrastructure, to the degree to which certain measures achieve overall project goals. The checklist below can help the design team wade through this process for the CCB project.

Step 1. Service/Need Definition

- ☐ What is the service needed for the space and who or what is prescribing this need?
- ☐ Are these appropriate needs and/or demands for the space?
- ☐ What are the specifications that have been assigned to this need? What are the variables that could be changed?
- ☐ What could be done to increase the flexibility of these specifications?
- ☐ Would the needs for the space be different if it were located elsewhere in the building?

Step 2. Reduce Needs through Passive/Whole-Systems Measures

- ☐ It is possible for a passive system to replace an active system?
- ☐ What would it take to eliminate an active system?
- ☐ What passive measures would reduce the size/use of an active system?
- ☐ What other systems are directly impacted by this system? How can negative impacts be further reduced?
- ☐ What other systems directly impact this system? What opportunities exist to reduce those impacts? Or to benefit from them?

Step 3. System Design: Multiple Benefits from Single Expenditures

- ☐ What is the best layout, placement, or location for this system?
- ☐ Have rules of thumb about the design of this system been questioned?
- ☐ If multiple people designed the system components, has one person thought about the whole picture?
- ☐ What are the boundaries/limits of this system? Would the design change if the boundaries (or zoning) changed? What are the optimal boundaries for this system?
- ☐ Is each individual component optimized and is the system as a whole optimized? Can you make one component "worse" or "better" to make multiple other components and thus the whole system better?
- ☐ How many functions does this system/component serve? Could it be adapted to serve more than one purpose (and eliminate the need for another system)?
- ☐ Is the system flexible? Can it change as building needs change?

Step 4. Efficient Technology

- ☐ Is this the most efficient technology available? What would the system look like if a more or less efficient product were used? What is the cost/benefit of doing so?
- ☐ Will a more efficient technology be available in the next 1, 2 or 5 years?
- ☐ Can the system be adapted or modified when new technologies become available?
- ☐ Does this technology use an appropriate energy supply source?
- ☐ Could this technology use a renewable technology supply?

Step 5. Controls and Demand Response

- ☐ Does this system/equipment need to be on all the time?
- ☐ Can this system be shut off or turned down for some of the time in response to varying operating parameters or factors it may be dependent on?
- ☐ Can this system be shut off or turned down to reduce operating costs by way of demand charges or peak utility charges?

Step 5. Use of Waste Streams

- ☐ What waste is created by this system?
- ☐ Can this waste be used in the building as a feedstock for another process?
- ☐ Is there a local service that can recycle or reuse this waste?
- ☐ Would a different system/design approach reduce waste?
- ☐ What is the lifespan of this product? How can this product/system be replaced in 5, 10, or 20 years?

Step 6. Appropriate Metrics

- ☐ What metrics are being used to analyze this system?
- ☐ Do these metrics include all value and costs? Are all the life-cycle costs and benefits captured?
- ☐ What is the purpose of this system? Is there a reason to spend more or less on this system? Are there exceptions for this system?
- ☐ Is this application replicable within the building? In other buildings?
- ☐ What are the risks of implementing this system?
- ☐ What would be the absolute best and worst application of this system?

Appendix 4: LEED EB O&M Scorecard

See following pages.

LEED 2009 for Existing Buildings: Operations & Maintenance
Project Scorecard

Project Name:
Project Address:

Yes	?	No			
11	5	0	**SUSTAINABLE SITES**		**26 Points**
		0	Credit 1	**LEED Certified Design and Construction**	**4**
1			Credit 2	**Building Exterior and Hardscape Management Plan**	**1**
1			Credit 3	**Integrated Pest Management, Erosion Control, and Landscape Management Plan**	**1**
5	4		Credit 4	**Alternative Commuting Transportation**	**3 to 15**
				Reduce by 10%	3
				Reduce by 13.75%	4
		5		Reduce by 17.5%	5
				Reduce by 21.25%	6
				Reduce by 25%	7
				Reduce by 31.25%	8
		9		Reduce by 37.5%	9
				Reduce by 43.75%	10
				Reduce by 50%	11
				Reduce by 56.25%	12
				Reduce by 62.5%	13
				Reduce by 68.75%	14
				Reduce by 75%	15
1			Credit 5	**Site Development -** Protect or Restore Open Habitat	**1**
1			Credit 6	**Stormwater Quantity Control**	**1**
1			Credit 7.1	**Heat Island Reduction -** Nonroof	**1**
1			Credit 7.2	**Heat Island Reduction -** Roof	**1**
	1		Credit 8	**Light Pollution Reduction**	**1**

Yes	?	No			
12	2	0	**WATER EFFICIENCY**		**14 Points**
Y			Prereq 1	**Minimum Indoor Plumbing Fixture and Fitting Efficiency**	**Required**
2			Credit 1	**Water Performance Measurement**	**1 to 2**
		1		Whole building metering	1
		2		Submetering	2
3	2		Credit 2	**Additional Indoor Plumbing Fixture and Fitting Efficiency**	**1 to 5**
				Reduce by 10%	1
				Reduce by 15%	2
		3		Reduce by 20%	3
				Reduce by 25%	4
		5		Reduce by 30%	5
5			Credit 3	**Water Efficient Landscaping**	**1 to 5**
				Reduce by 50%	1
				Reduce by 62.5%	2
				Reduce by 75%	3
				Reduce by 87.5%	4
		5		Reduce by 100%	5
2			Credit 4	**Cooling Tower Water Management**	**1 to 2**
		1		Chemical Management	1
		1		Non-Potable Water Source Use	1

Yes	?	No			
20	12	0	**ENERGY & ATMOSPHERE**		**35 Points**
Y			Prereq 1	**Energy Efficiency Best Management Practices -**Planning, Documentation, and Opportunity Assessment	**Required**
Y			Prereq 2	**Minimum Energy Efficiency Performance**	**Required**
Y			Prereq 3	**Fundamental Refrigerant Management**	**Required**
9	7		Credit 1	**Optimize Energy Efficiency Performance**	**1 to 18**

				ENERGY STAR Rating of 71 or 21st Percentile Above National Median	1
				ENERGY STAR Rating of 73 or 23rd Percentile Above National Median	2
				ENERGY STAR Rating of 74 or 24th Percentile Above National Median	3
				ENERGY STAR Rating of 75 or 25th Percentile Above National Median	4
				ENERGY STAR Rating of 76 or 26th Percentile Above National Median	5
				ENERGY STAR Rating of 77 or 27th Percentile Above National Median	6
				ENERGY STAR Rating of 78 or 28th Percentile Above National Median	7
				ENERGY STAR Rating of 79 or 29th Percentile Above National Median	8
			9	ENERGY STAR Rating of 80 or 30th Percentile Above National Median	9
				ENERGY STAR Rating of 81 or 31st Percentile Above National Median	10
				ENERGY STAR Rating of 82 or 32nd Percentile Above National Median	11
				ENERGY STAR Rating of 83 or 33rd Percentile Above National Median	12
				ENERGY STAR Rating of 85 or 35th Percentile Above National Median	13
				ENERGY STAR Rating of 87 or 37th Percentile Above National Median	14
				ENERGY STAR Rating of 89 or 39th Percentile Above National Median	15
			16	ENERGY STAR Rating of 91 or 41st Percentile Above National Median	16
				ENERGY STAR Rating of 93 or 43rd Percentile Above National Median	17
				ENERGY STAR Rating of 95+ or 45th+ Percentile Above National Median	18
2			Credit 2.1	**Existing Building Commissioning -** Investigation and Analysis	**2**
2			Credit 2.2	**Existing Building Commissioning -** Implementation	**2**
2			Credit 2.3	**Existing Building Commissioning -** Ongoing Commissioning	**2**
1			Credit 3.1	**Performance Measurement -** Building Automation System	**1**
2			Credit 3.2	**Performance Measurement -** System-Level Metering	**1 to 2**
				40% Metered	1
				80% Metered	2
1	4		Credit 4	**On-site and Off-site Renewable Energy**	**1 to 6**
			1	3% On-site or 25% Off-site Renewable Energy	1
				4.5% On-site or 37.5% Off-site Renewable Energy	2
				6% On-site or 50% Off-site Renewable Energy	3
				7.5% On-site or 62.5% Off-site Renewable Energy	4
			5	9% On-site or 75% Off-site Renewable Energy	5
				12% On-site or 100% Off-site Renewable Energy	6
	1		Credit 5	**Enhanced Refrigerant Management**	**1**
1			Credit 6	**Emissions Reduction Reporting**	**1**

Yes	?	No			
8	1	0	**MATERIALS & RESOURCES**		**10 Points**
Y			Prereq 1	**Sustainable Purchasing Policy**	**Required**
Y			Prereq 2	**Solid Waste Management Policy**	**Required**
1			Credit 1	**Sustainable Purchasing -** Ongoing Consumables	**1**
1			Credit 2	**Sustainable Purchasing -** Durable Goods	**1 to 2**
			1	40% of Electric	1
			2	40% of Furniture	1
1			Credit 3	**Sustainable Purchasing -** Facility Alterations and Additions	**1**
1			Credit 4	**Sustainable Purchasing -** Reduced Mercury in Lamps	**1**
	1		Credit 5	**Sustainable Purchasing -** Food	**1**
1			Credit 6	**Solid Waste Management -** Waste Stream Audit	**1**
1			Credit 7	**Solid Waste Management -** Ongoing Consumables	**1**
1			Credit 8	**Solid Waste Management -** Durable Goods	**1**
1			Credit 9	**Solid Waste Management -** Facility Alterations and Additions	**1**

Yes	?	No			
11	3	1	**INDOOR ENVIRONMENTAL QUALITY**		**15 Points**
Y			Prereq 1	**Minimum Indoor Air Quality Performance**	**Required**
Y			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	**Required**
Y			Prereq 3	**Green Cleaning Policy**	**Required**
1			Credit 1.1	**Indoor Air Quality Best Management Practices -** Indoor Air Quality Management Program	**1**
1			Credit 1.2	**Indoor Air Quality Best Management Practices -** Outdoor Air Delivery Monitoring	**1**
		1	Credit 1.3	**Indoor Air Quality Best Management Practices -** Increased Ventilation	**1**
1			Credit 1.4	**Indoor Air Quality Best Management Practices -** Reduce Particulates in Air Distribution	**1**
1			Credit 1.5	**Indoor Air Quality Best Management Practices -** Indoor Air Quality Management for Facility Alteratio	**1**
1			Credit 2.1	**Occupant Comfort -** Occupant Survey	**1**

	1		Credit 2.2	**Controllability of Systems -** Lighting	**1**
	1		Credit 2.3	**Occupant Comfort -**Thermal Comfort Monitoring	**1**
	1		Credit 2.4	**Daylight and Views**	**1**
1			Credit 3.1	**Green Cleaning -** High-Performance Cleaning Program	**1**
1			Credit 3.2	**Green Cleaning -** Custodial Effectiveness Assessment	**1**
1			Credit 3.3	**Green Cleaning -** Purchase of Sustainable Cleaning Products and Materials	**1**
1			Credit 3.4	**Green Cleaning -** Sustainable Cleaning Equipment	**1**
1			Credit 3.5	**Green Cleaning -** Indoor Chemical and Pollutant Source Control	**1**
1			Credit 3.6	**Green Cleaning -** Indoor Integrated Pest Management	**1**

Yes	?	No		
5	1	0	**INNOVATION IN DESIGN**	**6 Points**

3	1		Credit 1	**Innovation in Operations**	**1 to 4**
		1		Innovation or Exemplary Performance	1
		1		Innovation or Exemplary Performance	1
		1		Innovation or Exemplary Performance	1
		1		Innovation	1
1			Credit 2	**LEED® Accredited Professional**	**1**
1			Credit 3	**Documenting Sustainable Building Cost Impacts**	**1**

Yes	?	No		
0	0	0	**REGIONAL PRIORITY**	**4 Points**

			Credit 1	**Regional Priority**	1 to 4
		1		Regionally Defined Credit Achieved	1
		1		Regionally Defined Credit Achieved	1
		1		Regionally Defined Credit Achieved	1
		1		Regionally Defined Credit Achieved	1

Yes	?	No		
67	24	1	**PROJECT TOTALS (Certification Estimates)**	**110 Points**

Certified: 40-49 points **Silver:** 50-59 points **Gold:** 60-79 points **Platinum:** 80+ points

Appendix 5: An Introduction to Natural Capitalism

The book *Natural Capitalism* (1999), co-authored by RMI Chief Scientist, Amory Lovins, describes the opportunities that are arising with the birth of the green economy, which differs from conventional business systems in philosophy, goals, and fundamental processes. In the next century, as the human population doubles and the resources available to each person drop by one-half to three-fourths, a remarkable transformation of commerce and industry can occur. Through this transformation, society will be able to create a vital economy that uses radically less material and energy. Such an economy can free up resources, reduce taxes on personal income, increase per-capita spending on social ills (while simultaneously reducing those ills), and restore the damaged environment. Done properly, these necessary changes can promote economic efficiency, ecological conservation, and social equity.

Natural Capitalism (free at www.natcap.org) introduces four central strategies that enable companies and communities to operate by behaving as if all forms of capital were valued.

Radical Resource Productivity
Radically increased resource productivity is the cornerstone of natural capitalism because using resources more effectively has three significant benefits: it slows resource depletion at one end of the value chain; it reduces pollution at the other end, and provides a basis to increase employment with meaningful jobs. The result can be lower costs for business and society, which no longer has to pay for the chief causes of ecosystem and social disruption. Much environmental and social harm is an artifact of the uneconomically wasteful use of human and natural resources, but strategies for radical resource productivity can avoid degradation of the biosphere, make it more profitable to employ people, and thus safeguard against the loss of vital living systems and social cohesion.

One path to radical resource productivity is "end-use/least-cost thinking." RMI Chief Scientist and *Natural Capitalism* co-author, Amory Lovins coined the phrase to guide decision-making in the energy industry, though it applies to a wide range of situations. People don't want electricity or oil or coal, he reasoned. What they want are the services energy provides: illumination, cold beer, comfortable living rooms, hot showers, and so on. How can we provide these services, he asked, with the least overall cost? Lovins concluded that building central power plants to power baseboard heaters in drafty houses was not a least-cost solution to keeping people comfortable. For far less financial and environmental cost, one could simply insulate the houses properly. His ideas prompted some in the electric utility industry to implement "demand-side management," energy service programs that seek to meet customers' needs more cost-effectively through energy savings instead of providing more power at a high cost. Though this approach may sound like

common sense, it is actually a fairly novel way of making decisions. (www.rmi.org/sitepages/pid61.php)

Biomimicry
Natural systems create no waste. Everything that is no longer useful to one organism becomes food (energy) for another. Similarly, much industrial waste is a resource out of place, a nutrient seeking another industry where it can be of use. Reducing the wasteful throughput of materials—indeed, eliminating the very idea of waste—can be accomplished by redesigning industrial and business system along biological lines, enabling the constant reuse of materials in continuous closed cycles and often the elimination of toxicity. (www.biomimicry.net)

Industrial symbiosis (or waste matching) is an innovative form of industrial collaboration that redefines waste and by-products as inputs for other industrial operations. It "engages traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, and/or by-products" (Chertow). In a city, it can offer development opportunities regardless of prospects for future industrial expansion, creating more wealth within an existing mix of industries. See *Cuyahoga Valley Initiative: A Model of Regeneration* at www.rmi.org/sitepages/pid177.php.

Service and Flow Economy
A fundamental change in the relationship between producer and consumer is underway. It's a shift from an economy of goods and purchases to one of service and flow, which changes the incentives regarding reuse of materials. For example, nearly all offices now lease copier services rather than buy copy machines as they once did. Thus, it's in the interest of the copy-machine company to design the machine to be recyclable instead of designing it so that all the parts of an old machine are discarded.

In essence, an economy that is based on a flow of economic services can better protect the ecosystem services upon which it depends. This requires a new perception of value. It requires shifting from perceiving the acquisition of goods as a measure of affluence to an understanding that the continuous receipt of quality, utility, and performance promotes well-being. A "service-and-flow economy" offers incentives to put into practice the first two innovations of natural capitalism by restructuring the economy to focus on relationships that better meet customers' changing needs and to reward automatically both resource productivity and closed-loop cycles.

Investing In Natural Capital
Sustaining, restoring, and expanding stocks of natural capital will support the biosphere in producing more abundant ecosystem services and natural resources. This statement is based on the understanding that natural systems not only provide

products (*e.g.*, wood from a forest), they provide—at no cost—many services that humans cannot do without. (*e.g.*, flood control by a forest's root system). A community or company located near a river downstream of a mountain forest will eventually feel the effects if that forest's *products* are harvested without regard for its *services*. As history has repeatedly demonstrated, those effects can be catastrophic.

Businesses must restore, sustain, and expand the planet's ecosystems so that they can produce their resources and services even more abundantly. If businesses do not do so proactively, the cost of reinvesting in natural capital will increase, stocks will be depleted, and ecological problems will multiply. This will lead to societal pressures through regulation and costly and inefficient governmental actions. To avoid this scenario, reduce risk, and avert a reputation of environmental irresponsibility, a business must work to ensure that there will be sufficient ecosystem services in the future. This concept is the fundamental reason that many companies are reducing carbon emissions and buying carbon offsets even when they are not required by regulations to do so. Additionally, with growing consumer awareness, environmental stewardship offers a significant market advantage.

For more information, including free download of the book, see www.natcap.org.

This summary was authored by Michael Kinsley, Senior Consultant, RMI.

Appendix 6: Energy & Water, Materials & Waste Dashboards

See following pages.

Energy and Water Dashboard – Indy CCB

Indianapolis CCB Overarching Vision: To transform the City-County Building into a symbol of energy and water efficiency and green building technologies for Indiana.
RMI Approach: Whole Systems Integration – Driving the efficient and restorative use of resources, creating a world thriving, verdant, and secure, for all for ever.

	ENERGY USE	ENERGY SOURCES	WATER USE	WATER SOURCES	USER BEHAVIOR	TRANSPORTATION
VISION (BIG FAT AUDACIOUS IDEAS)	▪ 60-80% Total reduction (incl on-site RE) = >40% reduction in bldg energy use ▪ Carbon footprint positive ▪ Net energy producer ▪ $600k annual savings ▪ Daylight to the garage	▪ Bio-based methane ▪ 15% on-site renewable ▪ Balance purchased renewable = 100% ▪ PV panels: east/west wings ▪ Passive solar heating ▪ Increase E pump motors	▪ 30% Reduction in potable water use ▪ Zero stormwater discharge	▪ Potable water is used 2x before leaving bldg ▪ Eliminate well water use ▪ NEGAWATER ▪	▪ Understand impact and act/advocate ▪ Not just users but visitors and online visitors ▪ Create passionate and accountable people ▪ Plug in stations in demand ▪ Room level power control	▪ Reduce commuter emissions ▪ Reduce fleet emissions
STRATEGY (FOR BIGGEST IMPACTS)	▪ Open plan rather than offices ▪ Fiber optics/concentrating solar ▪ Change exterior lights to LED's and bio luminescence ▪ Ongoing retro commissioning plan ▪ Install/seal branch duct work ▪ New motors and regenerative brakes on elevators ▪ Decentralized lighting controls ▪ Waste heat recovery from core ▪ Lighting on occupancy sensors ▪ Daylight harvesting ▪ Lighting density analysis/ w adjustments ▪ Geothermal heat recovery from well? ▪ On-site renewable projects demo ▪ Green screens as exterior shading ▪ Second skin exteriors ▪ Task lighting at workstations w/occ sens ▪ Rehab windows… add hi-tech film, remove dark exterior shades ▪ Daylight sensors on perimeter lighting ▪ Garage lighting retrofit/ Light pipe	▪ Invest in wind energy ▪ Power purchase agreement ▪ Heat recover ventilation ▪ Heat recovery from chiller and groundwater ▪ Solar thermal/ desiccant ▪ Art turbines on monoliths in plaza ▪ Hybrid car energy storage ▪ Maglev turbines on roof	▪ Waterless urinals ▪ Low-flow / dual flush toilets ▪ Low-flow faucets – hydropower automatics ▪ Use ground water for heat recovery and flushing toilets ▪ Re-use dewatering (sump) water	▪ 225 GPM ground water sump pump to chiller / toilets / irrigation / fountain ▪ Dual flush toilets ▪ Daylight bioswale ▪ Groundwater solutions meeting with adjacent bldg owners.	▪ Optimal work environment ▪ Educate users ▪ Personal/department commitment ▪ Incentivize lower energy use (competition? Party? Rebates?) ▪ Provide feedback and two way communications ▪ High/Low elevators = energy savings ▪ Energy star rating ▪ Power down policies ▪	▪ Incentivize bicycling, mass transit, telecommuting ▪ Eco-passes
BARRIERS (CHALLENGES)	▪ Need metering at each floor/dept ▪ No dept accountability for energy use ▪ Acoustical concern for open plan ▪ Existing voltage is 120, 240 may be more efficient? ▪ Windows-screens block daylighting ▪ Inertia – resistance to change ▪ Central lighting controls ▪ Asbestos present in the building	▪ No long term master plan ▪ Cost of renewable energy ▪ Efficiency of PV tech ▪ Payback period is too long for current policy ▪ RECs: do they really	▪ Focused on capital cost, not LCC ▪ FINANCING! (deadline for ARRA funds) ▪ Longer payback ▪ Bad impressions of waterless urinals ▪ STATE CODES: grey	▪ Greywater to toilets hard to retrofit ▪ Sizing/designing bioswale for cumulative water in urban setting ▪ Water quality?	▪ Occupant attitude ▪ Occupant habits ▪ Infrastructure cost ▪ Lack of knowledge ▪	▪ Attitude ▪ Parking is awarded based on seniority not vehicle efficiency ▪ No infrastructure, cost, space

		make sense? ▪ Limited S.F. on roofs ▪ Changes in administration	water			
SOLUTIONS (TO OVERCOME BARRIERS)	▪ Create "Model" open office with daylighting, conference rooms, and priv. areas ▪ PR to occupants for buy-in ▪ Start with conservation, then projects ▪ Get BASELINES ▪ Show data: internet based tool visual analogy/ lobby kiosk	▪ Set up a bond Performance contract ▪ PR strategy to sell to taxpayers ▪ Baseline energy model ▪ Iterative model for waste heat recovery etc. ▪ Partnership with FEMP/Unions for renewable install ▪ Regenerative brakes on elevators ▪ Plug-in hybrids for fleet	▪ Green roof as a plaza (parking is underneath) ▪ Generate electricity from sump/rainwater? ▪ Low-flow urinals ▪ Replace faucets ▪ Rain sensors on irrigation system	▪ Change the greywater codes ▪ Eliminate lowest level of parking ▪ Convene a downtown bldg owners mtg to address urban scale water table pumping uses.	▪ Pilot project on one floor ▪ Real time feedback ▪ Green leases ▪ Implement energy policies /purchasing ▪ Educate/newsletter/video ▪ Occupant workshop – ideas ▪ INCREASE OCCUPANT AWARENESS ▪ Education program ▪ Occupant surveys	▪ Bike racks/showers/lockers ▪ Plug-in station ▪ Community based social awareness – celebration ▪ Pilot programs ▪ Transit passes ▪ Cultural trail connection ▪
PRIORITIES (TOP 3-4)	▪ Green leases for each dept ▪ Recommissioning – 3rd party ▪ Adaptive comfort adjustments ▪ Long term strategy for space planning ▪ SUB-METERING ▪ Assess performance / surveys ▪ Create an Energy budget	▪ Signage, lights-off campaign ▪ Energy audit ▪ Calculate GHG footprint ▪ Evaluate geothermal water potential ▪ Limit occupant overrides ▪ VAV feasibility report ▪ Heat recovery wheels	▪ Create a Master plan ▪ Explore water and energy model ▪	▪ Find some place to put sump water – downtown bldg owners' meeting	▪ Energy fairs ▪ Occupant surveys	▪ Promote bicycle enthusiasm w Cultural Trail development

Materials and Waste Dashboard – Indy CCB

Indianapolis CCB Overarching Vision: To transform the City-County Building into a symbol of energy and water efficiency and green building technologies for Indiana.
RMI Approach: Whole Systems Integration – Driving the efficient and restorative use of resources, creating a world thriving, verdant, and secure, for all for ever.

	BLDG MATERIALS	OFFICE SUPPLIES	WASTE	USER BEHAVIOR
VISION (BIG FAT AUDACIOUS IDEAS)	▪ All remodels meet LEED Gold min ▪ 90% Re-use or recycle existing materials ▪ Native landscape plaza ▪ Innovation pt in LEED (95% + excl in MEP) ▪ MR CR3 (95% sustainable purchases) ▪ Exemplary limited VOC's ▪ Conspicuous separate dumpsters for ongoing renovation waste	▪ Green cleaning in next contract ▪ 95% sustainable purchasing ▪ Educate, educate, educate ▪ Centralize purchases or qualified vendor list ▪ PAPER → reduce drastically	▪ Profit from paper recycle stream ▪ New home for panels/retrofit/alter ▪ Reduce operating waste to >75% diversion ▪ Educate, educate, educate ▪ Waste into art / edu → Partner with schools ▪ Green cleaning policies ▪ Purchasing policy ▪ Maintenance guidelines	▪ Eliminate bottled water use / sales ▪ Sustainable regional food in gift shop ▪ Occupant survey/ engage employees (coffee breaks) ▪ 100% participation in programs ▪ Make the CCB a city wide example of a GREEN WORPLACE ▪ Brand it! Coffee mug ▪ Find the champions and celebrate them, then make more green champions ▪ Achieve 30% better space utilization ▪
STRATEGY (FOR BIGGEST IMPACTS)	▪ Establish policy ▪ Buy local / regional materials ▪ Retrofit /reuse panels+doors ▪ Model urban garden ▪ Write into materials specs ▪ Purchase refurbished office systems ▪ PARTNERSHIPS → create a critical mass ▪ Purchase w LCA as factor - durability ▪ Vendor prequalification ▪ Service model for furniture/carpet/electronics	▪ Shared resources (copiers/printers) ▪ Building management purchasing policy ▪ Utilize interns for research ▪ Payroll process electronic statements ▪ Paper – RECYCLED CONTENT 30% is easy ▪ Default settings on printer/copiers is DUPLEX always ▪ Be conscious of chemical impacts: air quality ▪ Upgrade air filters if necessary ▪ Proper ventilation	▪ Recycling at each desk ▪ Visible recycling program in public areas ▪ Sort materials / mixed recycling? ▪ Limit paper use – involve IT ▪ Accelerate existing initiative in data center ▪ Provide green cleaning supplies on each floor for individual staff access ▪ Composting?	▪ Include tenants in implementation plans ▪ Tenant standards/incentives ▪ Centralized break rooms ▪ Better amenities in plaza - useful ▪ Peer education/pressure ▪ Recycler of the month ▪ Make it convenient – co locate ▪ Track for PRINTING by department / employee ▪ Communicate! Email distribution list. ▪ Create awareness and accountability at individual level
BARRIERS (CHALLENGES)	▪ Possible "historic" designation (also funding opportunity, however) ▪ Contractor perception ▪ Verification ▪ Quality control (re: LEED) ▪ Where to we put it? ▪ How do we change behavior	▪ Departments are siloed – no means of regular communication ▪ Cost perception ▪ Availability of supplies ▪ Processing/manufacturing of supplies needs to be considered ▪ Paper requirements for courts is absurd and ingrained	▪ Space allocation ▪ How do we convey importance to taxpayers ▪ Initial cost vs payback	▪ Time required to set up programs ▪ Printing mayor's name on city documents – limited life ▪ Lack of enforcement for new policies ▪ Administration changes ▪ Centralized break rooms - Not currently allowed ▪ Quantify the benefits of increased productivity and lower absenteeism
SOLUTIONS (TO OVERCOME BARRIERS)	▪ Public solutions/wins – small bus opp ▪ Working model with payback ▪ Education of building authority staff ▪ Training, show examples & positive impacts ▪	▪ Outreach to depts and other municipalities ▪ Central purchasing incentives / consortium ▪ Sustainable office supply catalogs ▪ 10% higher cost but 40% reduction in total use	▪ Waste stream audit ▪ Waste management plan ▪ Re-allocate space for recycling ▪ Create a case study ▪ Monitor and show before/ after ▪ Source of funds determines what is studied/measured	▪ Office of Sustainability initiate email distribution list for building occupants ▪ Make time ▪ Delegate some work to person in each department ▪ Training from HR/sustainability office ▪ Educate → tell the full story

Materials and Waste Dashboard – Indy CCB

		▪ Run a baseline INDOOR IAQ	▪	▪ Anticipate challenges & communicate them, honesty when things don't work out ▪ Be the Lab for Indianapolis ▪ BIG EVENT TO KICK IT OFF
PRIORITIES (TOP 3-4)	▪ Study of "open" office panels → reuse/reconfigure existing? ▪ Create permanent recycling program with CHAMPION	▪ Green catering for city events- require this and build local capacity ▪ Local recycle bins w central trash ▪ GREEN PROCUREMENT POLICY	▪ Waste stream audit ▪ Setting baseline ▪ Create recycling / waste policy	▪ Space utilization analysis ▪ EDUCATE ▪ Create bldg email list ▪ MEASURE & COMMUNICATE

Appendix 7: Sustainability Gameplan

See following pages.

Sustainability Gameplan

STAGES/TASKS

Short Term

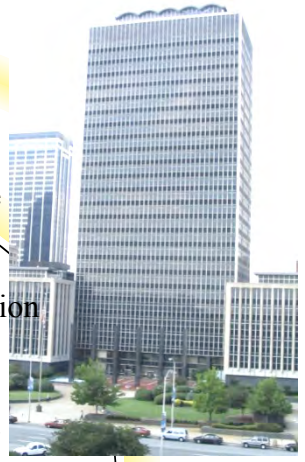
- Green Training Program
- Occupant Survey
- Energy Audit
- Waste Audit
- Baseline Model/Calcs
- BLDG Auth policies – cleaning supplies
- Capture equipment cycle
- Master Plan (as a flexible System
- Assess funding opportunites
- PR on sustainable process/transportation
  - Public + stakeholder/transportoin
  - Build the "Branding"

Medium

- Green leases – courts, canteen
- Service Contracts
- Submetering
- LCA, ECMs, modeling packages
- Feasibility study for water sources, re-direction, etc
- Assess greywater codes
- Pursue Funding
- LEED registration
- 1st projects – faucets, recycling
- Binding/on-going momentum

Long Term

- LEED gold 2012
- Expand Impact to other buildings
- Policy changes implementation
- Look for more opportunities for "net plus"
- Publish Case Study



PRIMARY OBJECTIVES

- Flagship project Building to Make Indy Greenest
- Catalyze Green Momentum
- Greenest Public Building Renovation in Indianapolis/County
- Tool For Education

TARGET

- Prove the business case / ROI / accountability to taxpayer
- Source of Pride / Green Destination
- Create Empowered & Passionate Users!

OTHER OBJECTIVES

SUCCESS FACTORS

- Good Publicity
- Professional Empowered Occupants
- Ripple Effect to other Buildings
- Realizing Energy Savings
- Extreme CCB Makeover

Great Strides shown in Survey

Higher Retention/productivity better health

"If you don't know where you are going, you will wind up somewhere else."

- Yogi Berra

CHALLENGES

- $$$
- Public Political Perception
- Institutionalized Inertia
- Selling Business Case
- Multiple Tenants
- Occupied bldg with critical functions

- In-Kind Source
- Savings from No-Cost measures
- Operational Lease
- ARRA
- Bonds
- Foundations
- Donations – buy a PV panel

Appendix 8: CCB Current Building Data

See following pages.

Building Data

Building Management:
Indianapolis/Marion County Building Authority

Date of Construction:
First occupied January 1962
Design completed in 1959 by Lennox, Matthews, Simmons & Ford, Inc., Wright, Porteous & Lowe/Bonar

Size:
28 Stories high (372' tall)
Gross area - 731,119 sf
Rentable area - 624,210 sf

Occupants:
2,000-2,400 approx employees
4,275 visitors (12-11-08)

Energy Use Intensity:
113 kBtu/GSF 2008 ($700k/yr)

Average energy use intensity for this building size and era:	141 kBtu/GSF
Average energy use intensity for all US office buildings:	94 kBtu/GSF
Average energy use intensity for LEED buildings:	69 kBtu/GSF

Average Annual Cost of Electricity: $1.18M

Water Use Intensity:
19.48 gal/sf 2008 ($30k/yr)
Target range water use intensity for US office bldgs: 9 -15 gal/sf
Cooling & Irrigation water source from an on-site well
Average Annual Cost of Water + Sewer: $56k

Hours of Operation:
9th Floor and East Wing @24/7
West Wing and Tower - primarily 7:00 a.m. to 6:00 p.m. Mon.-Fri.
Public Assembly Room and meeting rooms have frequent eve meetings
Building accessible 24/7, security on duty 24/7

Construction:
Steel framing
Glass & aluminum curtain wall for Tower
Granite and limestone facades for East and West wings
Windows are 1-inch overall insulated panels
Roof is two-ply modified bitumen system installed in 2007
Building on 4'-6" module for ceilings, windows, lights

Lighting:
Typical office lighting is one nominal 1′ x 4′-6″ fixture per 4′-6″ square module; each fixture has one T8 bulb with a reflector; one electronic ballast serves four fixtures; lighting renovation complete in late 1990's

Mechanical Systems:
Air-handling systems are high-pressure, dual duct; pneumatic temperature control system with individual office thermostats; chilled water coils and steam heating coils in built-up AHU's; 13 large built-up AHU's, several smaller

- Originally three Trane Centravac R-11 chillers at 1,500, 1,350 and 1,000 tons;
- Two largest chillers converted to R-123; separate 100-ton system for 9th floor
- Data center
- Cooling tower replaced in 2005 – BAC – total of 2,500 tons – 3 sections

Building Controls:
Johnson Controls building automation system installed in 2008;
Metasys Extended Architecture

Metering:
No sub-metering
Separate meters for cooling equipment

Plumbing Fixtures:
Toilets - American Standard – 3.5 gal/flush (testing 2.4 gal/flush)
Lavatories - American Standard with a variety of reduced-flow aerators
Urinals - American Standard – 1.0 gal/flush

Alterations Since Construction:

- Escalators and Observatory elevator (hydraulic) added in late 1960's
- Sun screens added to east, west and south facades in 1977
- Elevator modernization completed in 2005
- Cooling tower replaced in 2005 (first replacement)
- Roof replaced in 2007 (first replacement)
- Chillers converted in 1995
- New filtration systems (85%-efficient bag filters) installed on all AHU's in late 1970's
- Sixteen courts added to building in several phases
- Office alterations and relocations throughout history of building
- Lobby revisions for security systems in 2003